

Probabilistic Monitoring in Virginia: Experiences From the First Five Years

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Acknowledgements

- **VDEQ Monitoring Staff**

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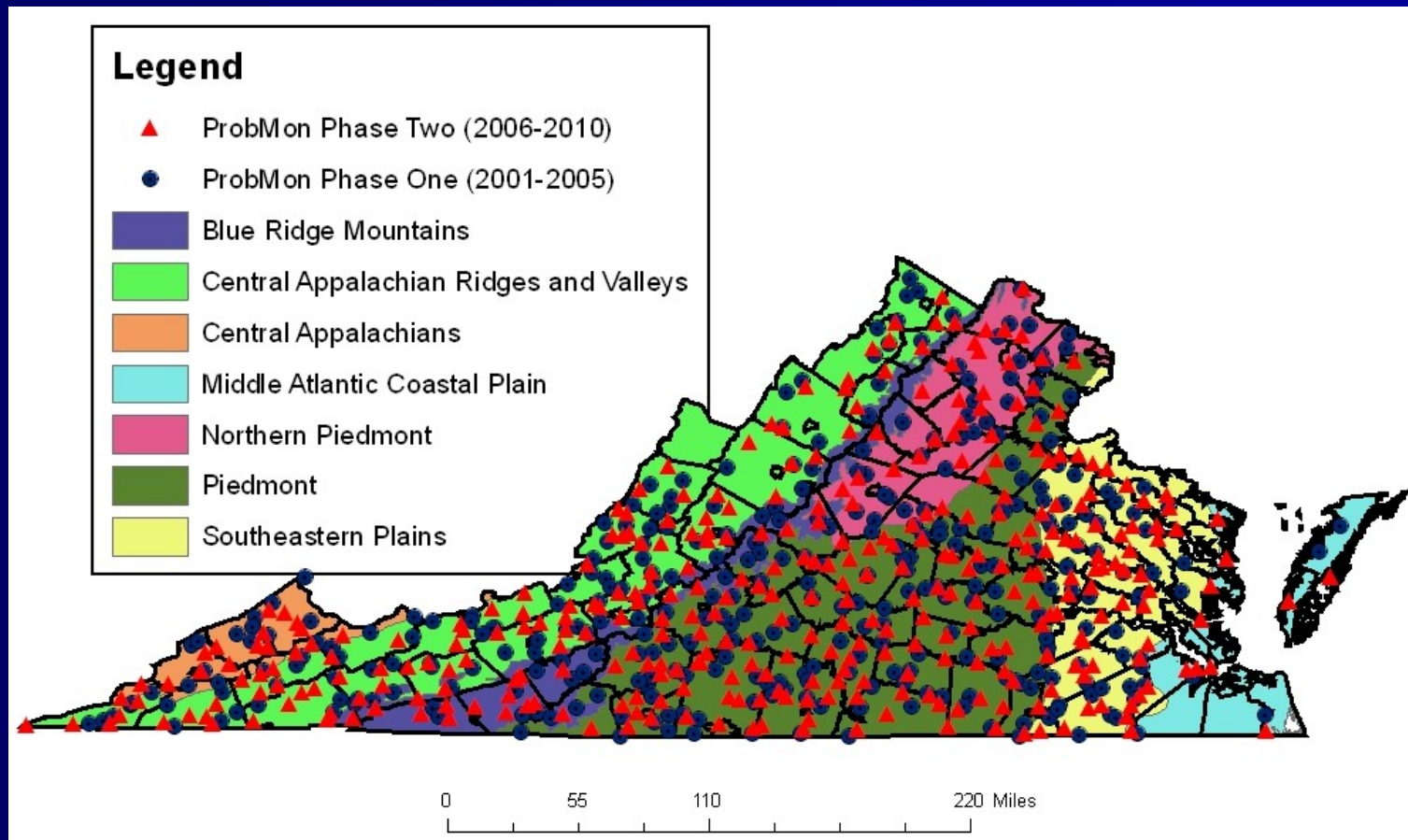
- **USEPA**

Greg Pond, Maggie Passmore, Karen Blocksom, Tony Olson

Background

- 1997 - Water Quality Monitoring, Improvement, and Restoration Act (WQMIRA)
- 1999 – VDEQ monitoring taskforce revamps monitoring programs
- 2001- Probabilistic monitoring (ProbMon) begins

Sample Locations



Sample Reconnaissance

- Biologist contacts the landowner
- Sample spring and fall (different parameters)
- Four years of potential sampling (n=280)
 - 234 target and sampled (code 1)
 - 13 permission denied (code 2)
 - 9 other target (code 2)
 - 24 non-target (estuarine – code 3)

Case Studies

- Biomonitoring validation study
- Report condition of 100% stream miles
- Support Total Maximum Daily Load studies
- Track watershed management decisions
- Support water quality standards development
- Innovative monitoring strategies

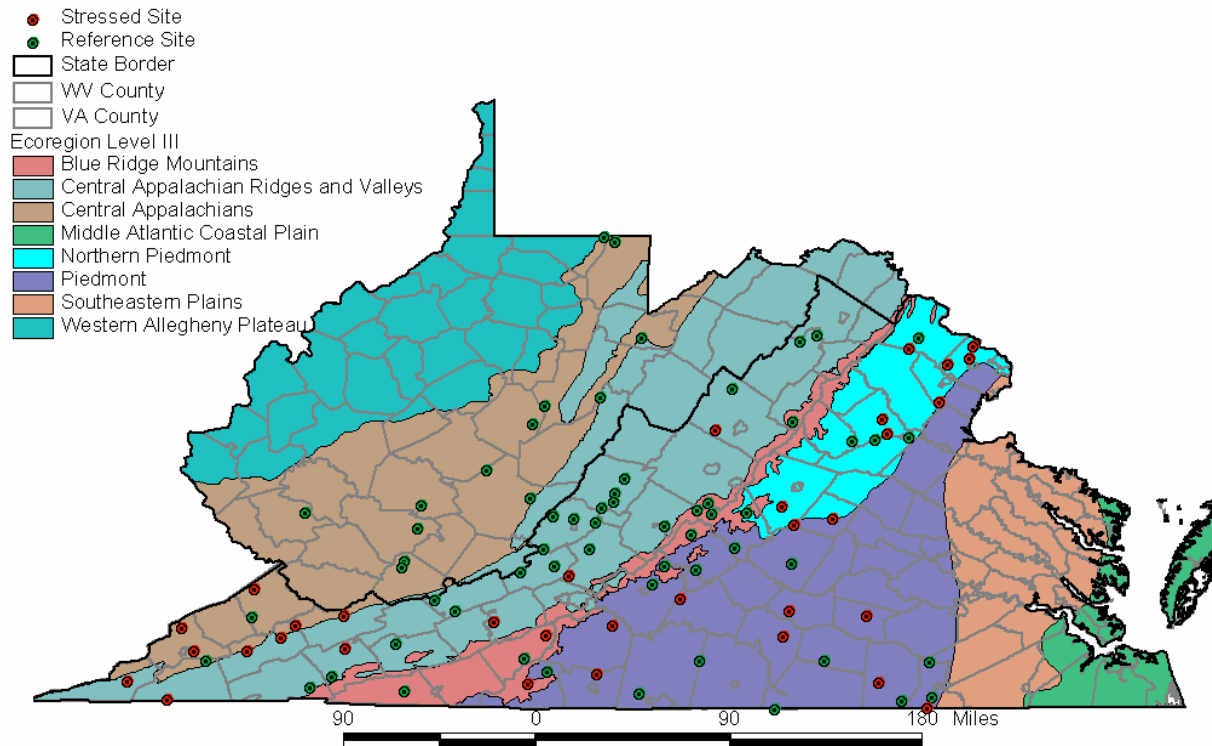
Biomonitoring Validation



- 2001 biological index development for non-coastal Virginia begins (8 core metrics)
- Final report submitted in September 2003
- VDEQ concerned with data used to develop the Virginia Stream Condition Index (VSCI)
 - Lack of watershed size diversity
 - Bias toward mountainous ecoregions
 - Multiple samples at the same location

Biomonitoring Validation

New reference stations (n=104 total samples)



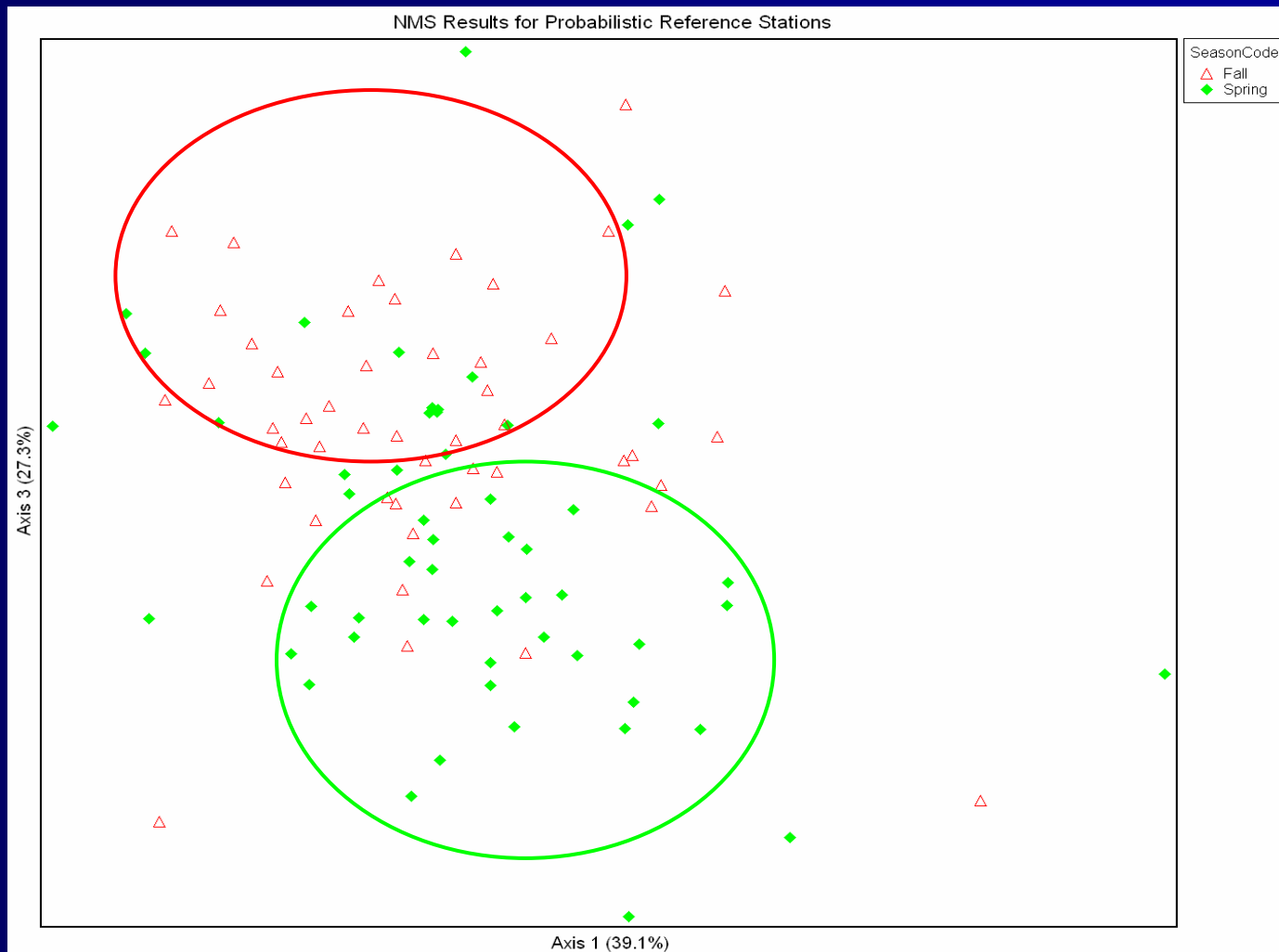
Mountain (n=71), Piedmont (n=33)

Biomonitoring Validation

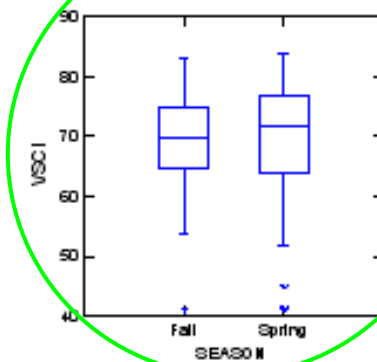
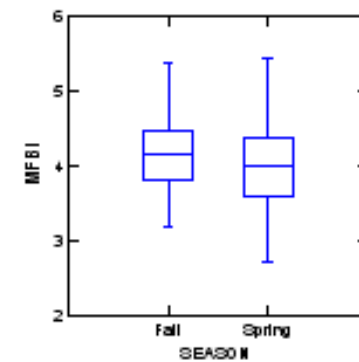
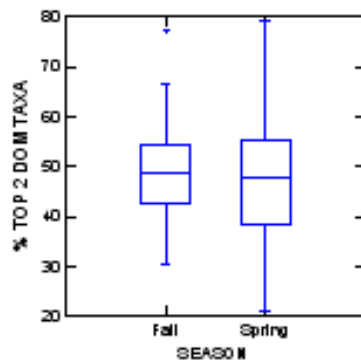
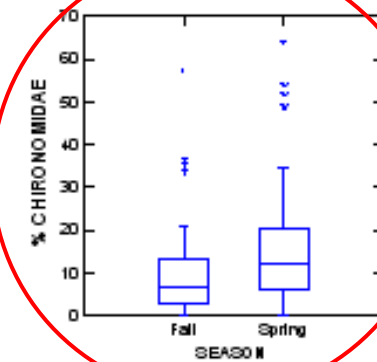
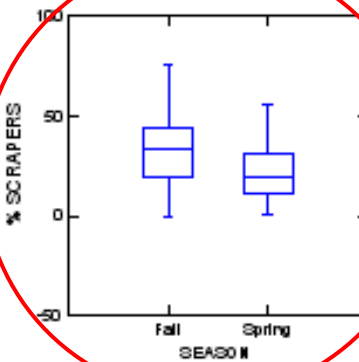
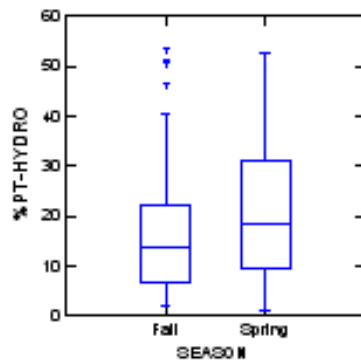
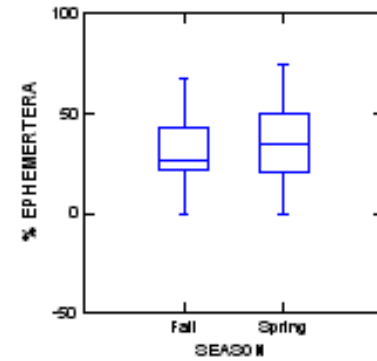
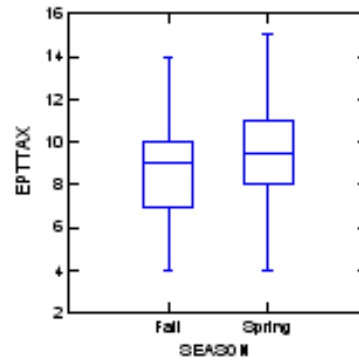
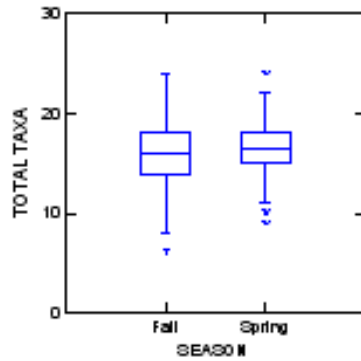
Categories: season, basin size, ecoregion, bioregion, basin size, VDEQ region, river basin

- Test for patterns in reference taxa
- Test for statistical significance
- Test for environmental significance
- Best standard value calibration

Biomonitoring Validation

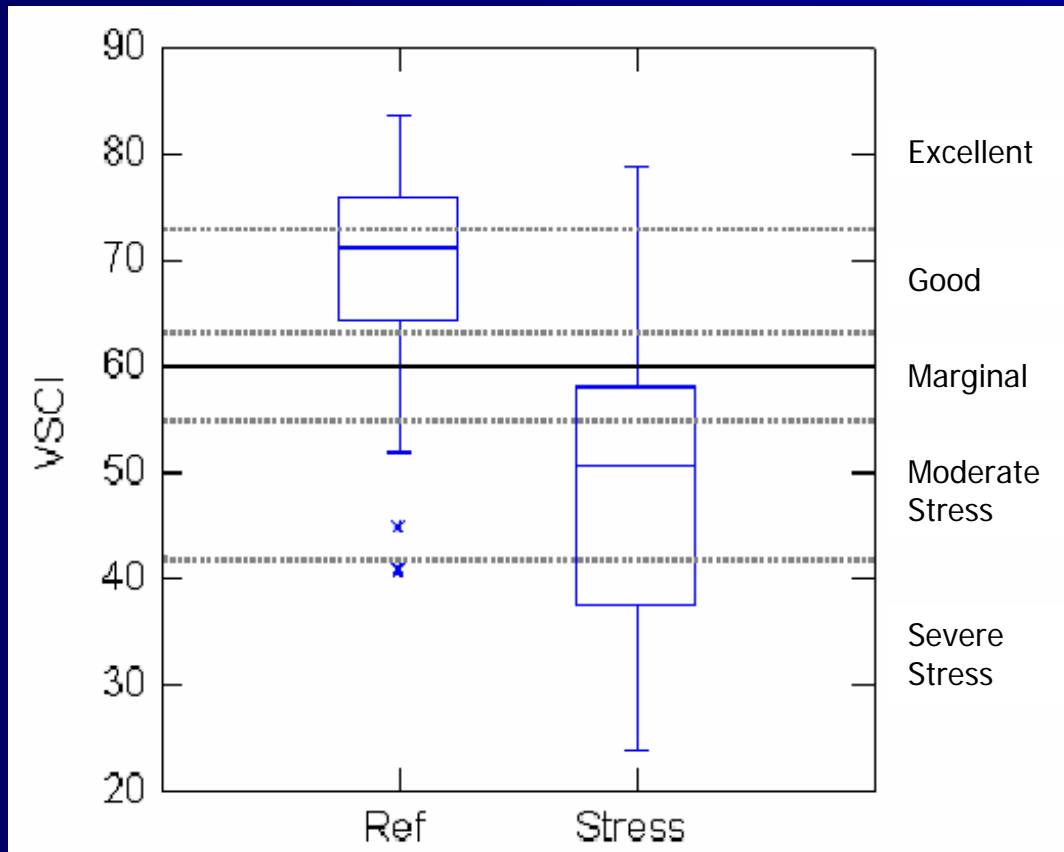


Environmental Significance? Season?



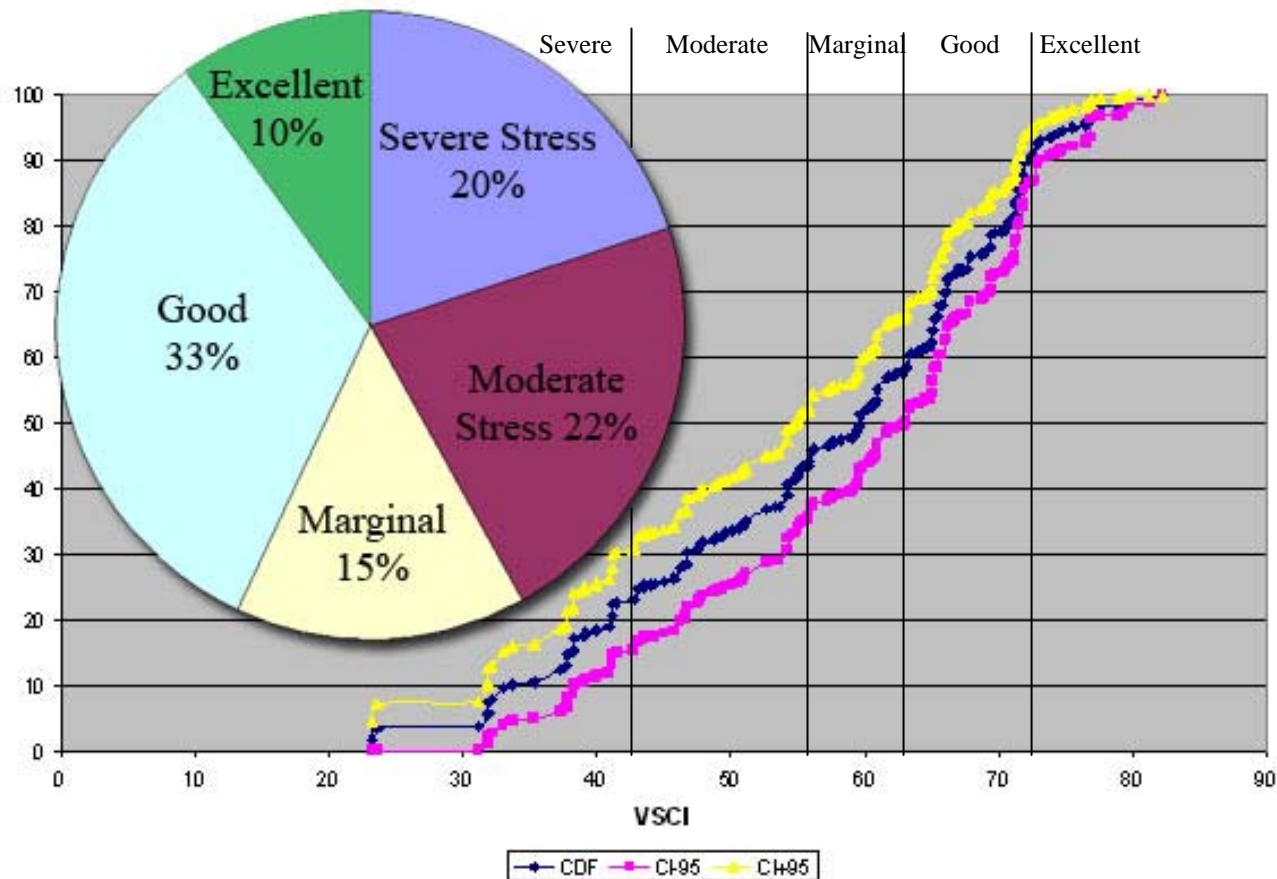
Biomonitoring Validation

- VSCI works!
- <http://www.deq.virginia.gov/probmon/pdf/scival.pdf>



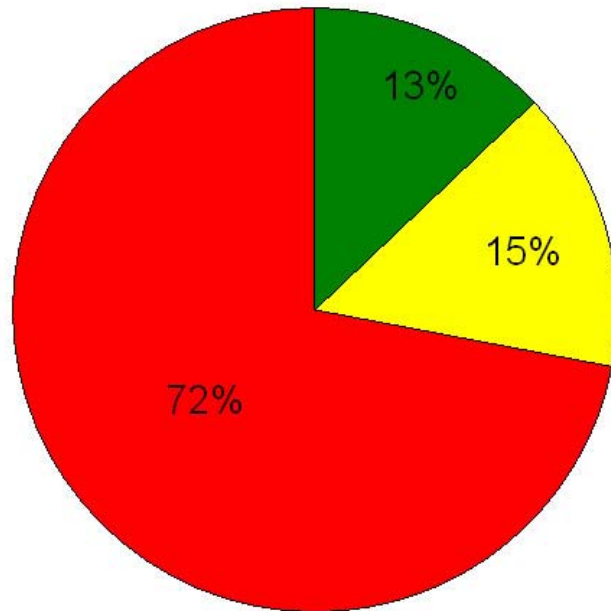
Report 100% Stream miles

Non-Coastal Virginia Stream Condition Index



Report 100% Stream miles

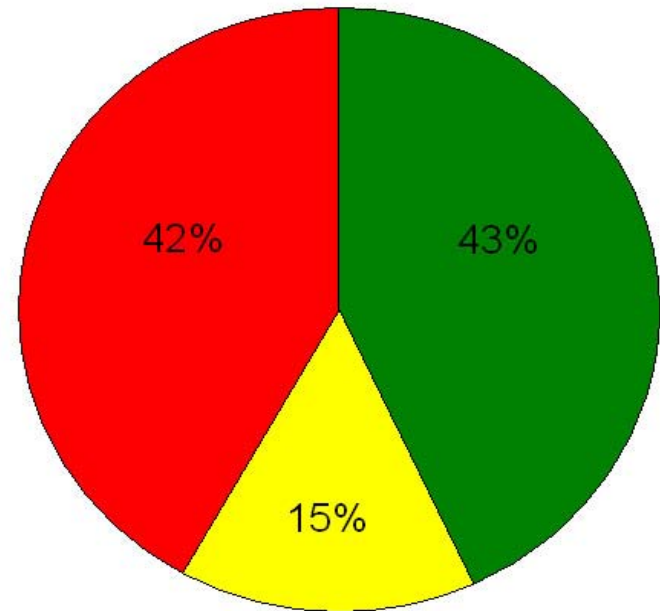
Mid-Atlantic Coastal Plain (MACP) Streams



Virginia Coast +/- 17%



Virginia Stream Condition Index

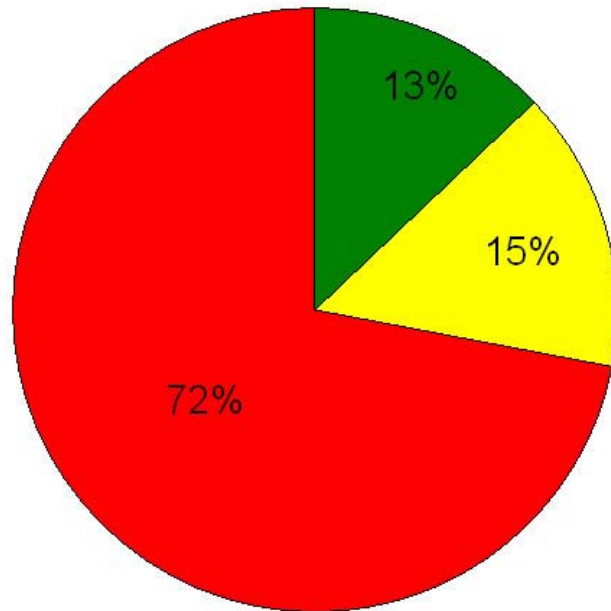


Virginia Non-Coast +/- 4%



Report 100% Stream miles

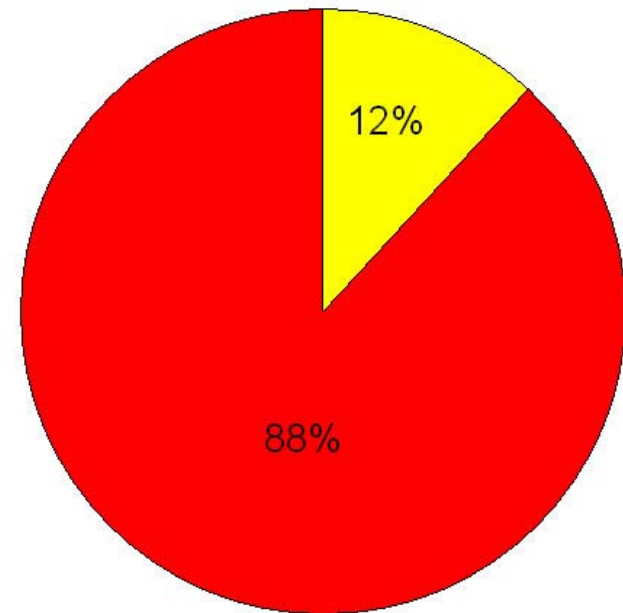
Mid-Atlantic Coastal Plain (MACP) Streams



Virginia ProbMon +/- 17%



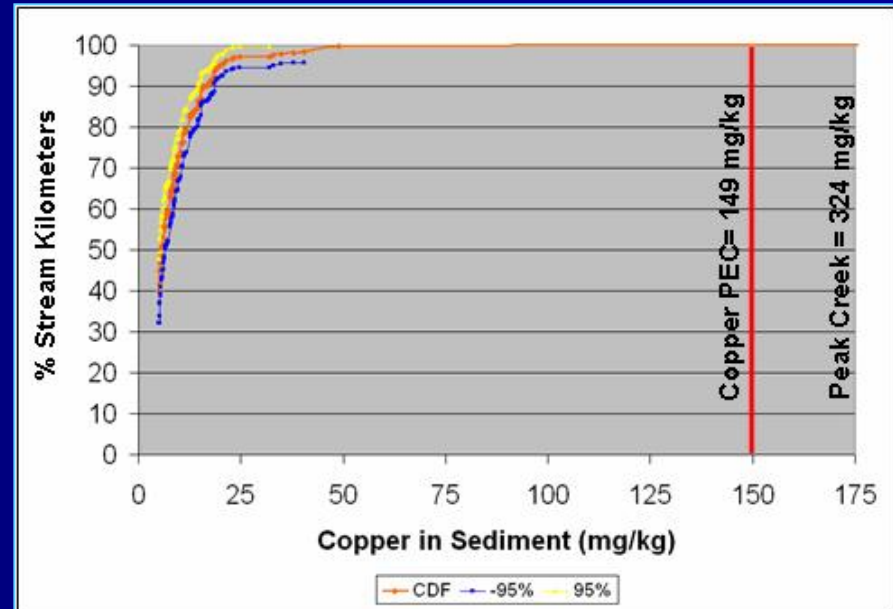
Mid-Atlantic Integrated Assessment (MAIA)



Regional EPA Survey +/- 23%

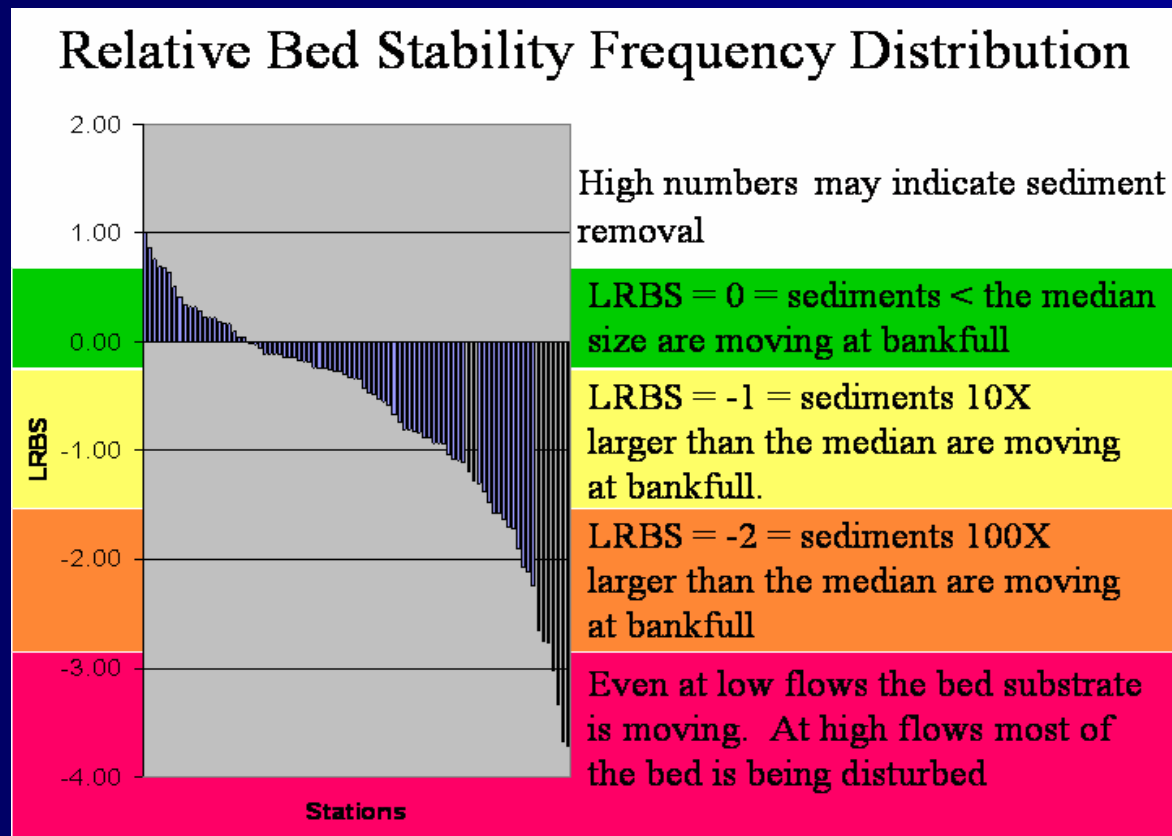


Support TMDL Development



- Peak Creek (Metal TMDL)
- UT Chickahominy (Nutrient TMDL)
- Straight Creek (Ionic Strength TMDL)

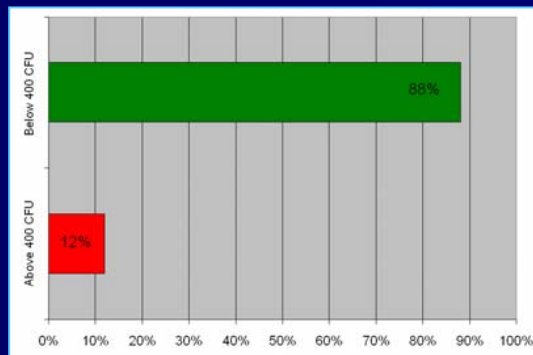
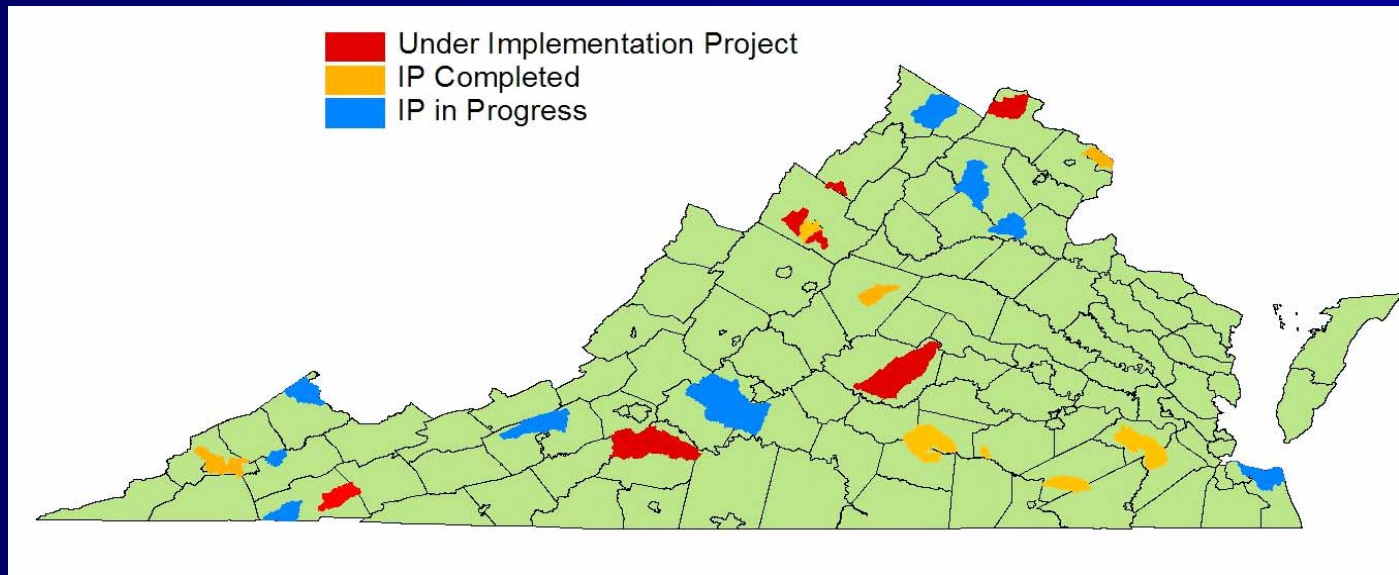
Support TMDL Development



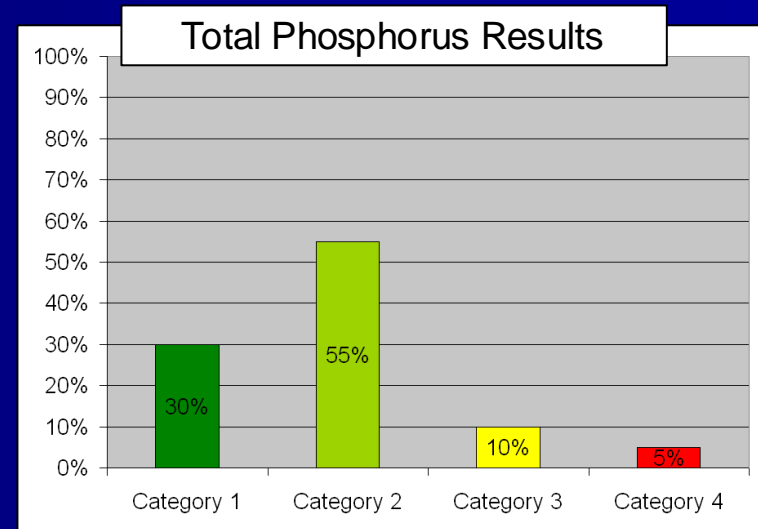
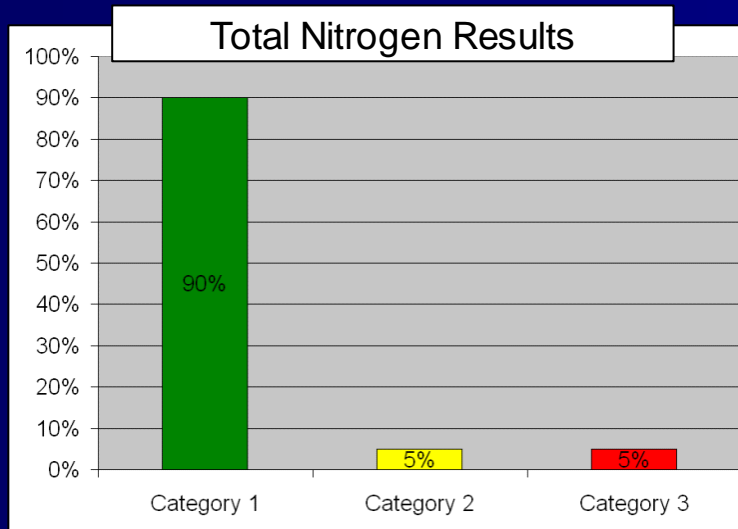
- Sediment endpoint in many biological studies
- Relative bed stability=quantitative habitat data

Tracking Watershed Management

Virginia has 8 Implementation Plans in progress



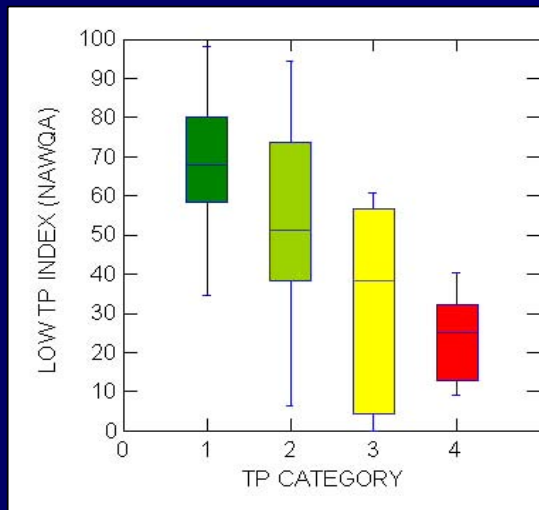
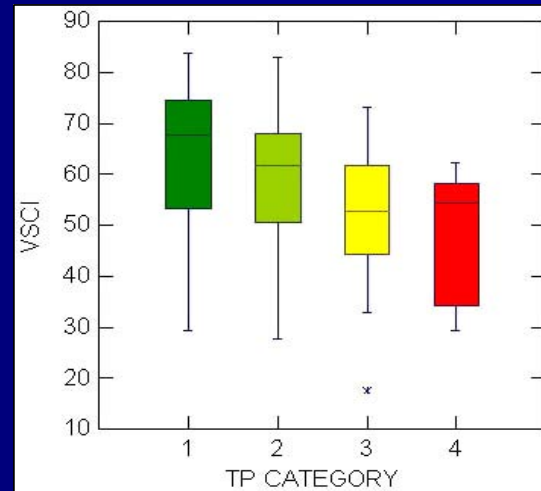
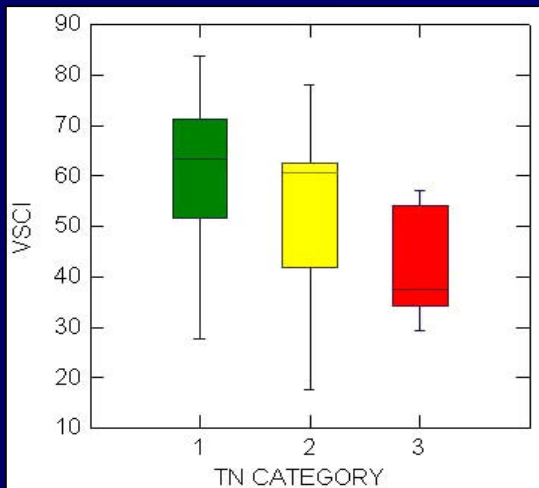
Standards Development



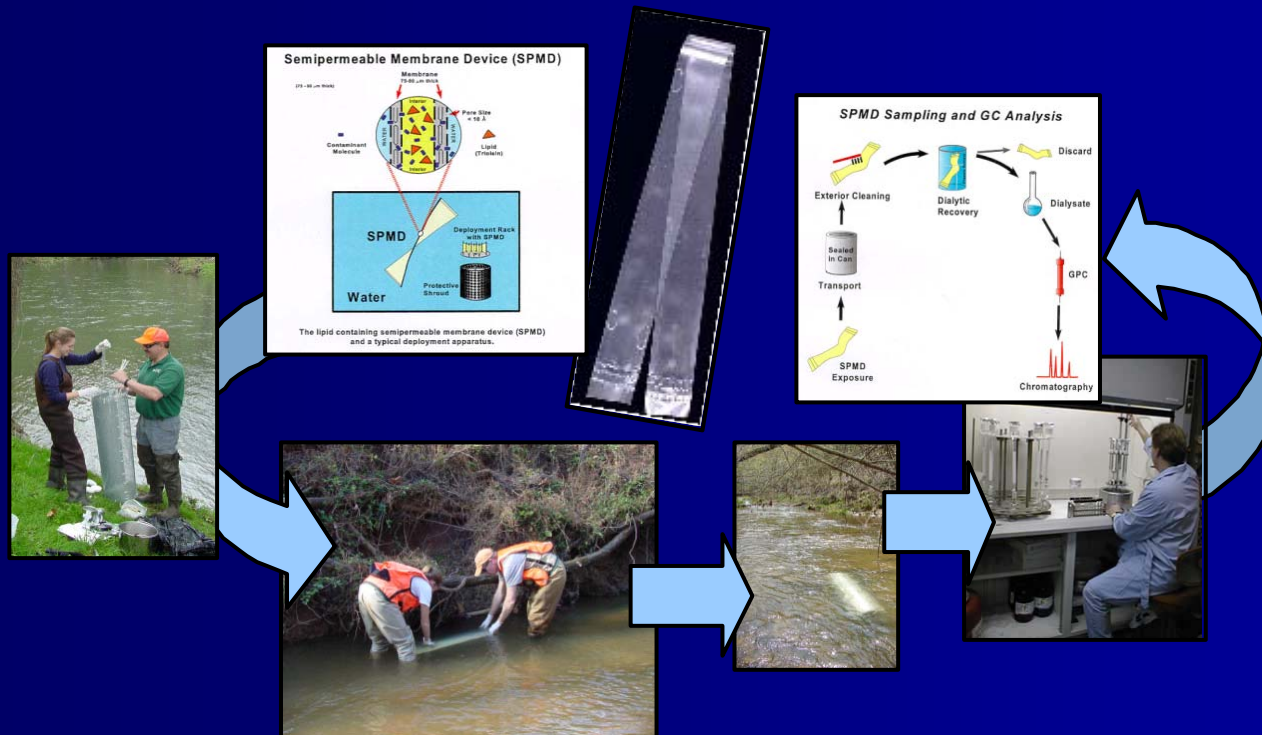
- Category 1: <1 mg/L
- Category 2: 1-2 mg/L
- Category 3: >2 mg/L

- Category 1: <.01 mg/L
- Category 2: .01-.05 mg/L
- Category 3: .05-.1 mg/L
- Category 4: >.1 mg/L

Standards Development

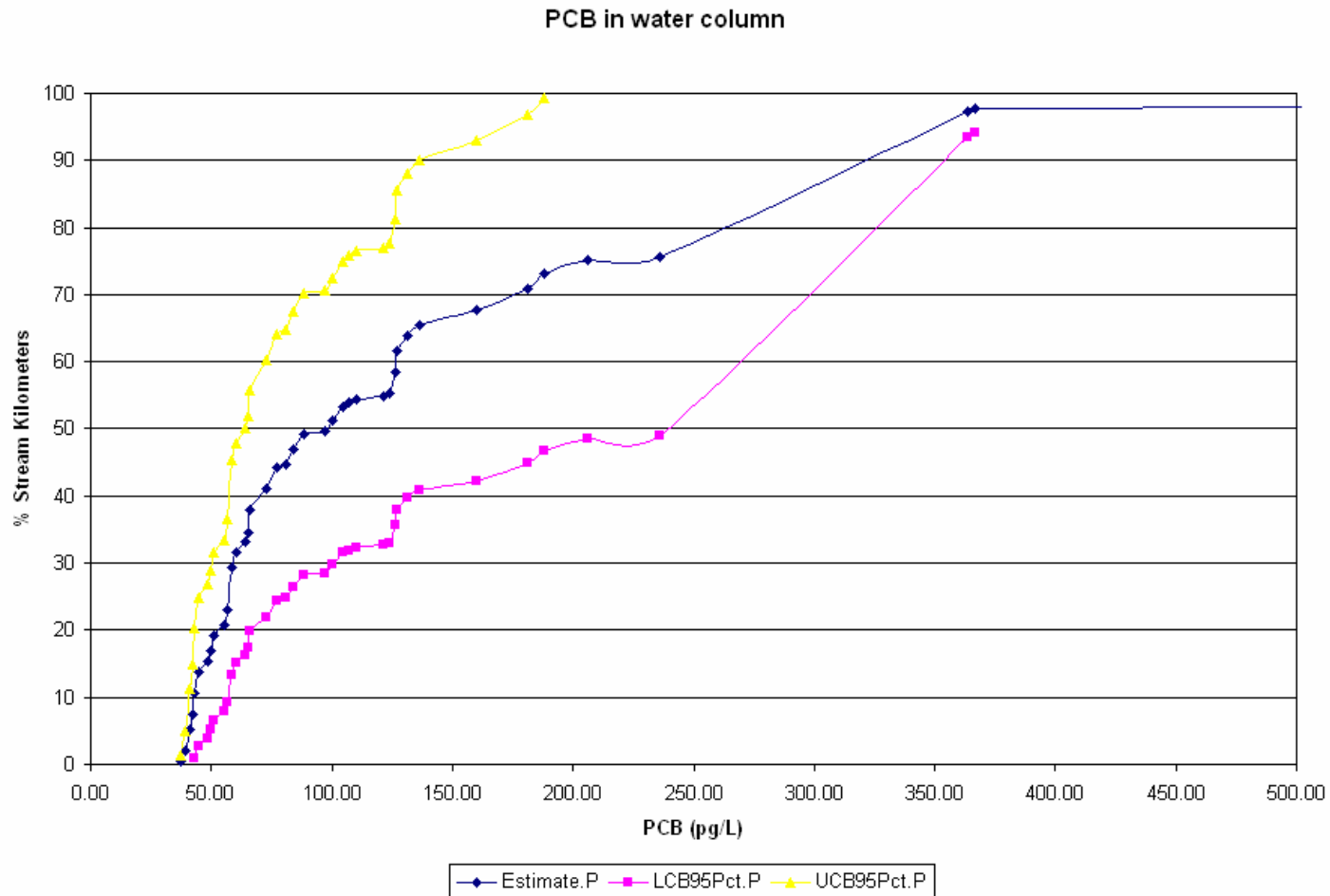


Innovative Monitoring



- Semi-permeable membrane device (virtual fish)
- Determine water column concentration

Innovative Monitoring



Summary of Benefits of ProbMon

- Biomonitoring
 - Doubled the number of reference sites
 - Validated VSCI
 - Identification of stressor(s)
- New Technologies
 - Relative bed stability
 - Virtual fish
- Assessments
 - Statistical confidence in stream conditions
 - Track water quality improvement
- Research
 - Provides design for testing new methods
 - Monitoring strategy allowed VDEQ to obtain grant money
- Community
 - Provide regional summaries to the public
 - Partnerships (DGIF, EPA, USGS, VT)

Questions?

VDEQ

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<http://www.deq.virginia.gov/probmon/>